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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/576,778	05/23/2000	Martin Schulein	5843.200-US	1722

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NOVOZYMES NORTH AMERICA, INC.
500 FIFTH AVENUE
SUITE 1600
NEW YORK, NY 10110

EXAMINER

RAO, MANJUNATH N

ART UNIT	PAPER NUMBER
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1652

DATE MAILED: 05/14/2003

18

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/576,778

Applicant(s)

SCHULEIN ET AL.

Examiner

Manjunath N. Rao, Ph.D.

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on 31 January 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☐ Claim(s) 43-61 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☐ Claim(s) 43-61 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

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DETAILED ACTION

CONTINUED EXAMINATION UNDER 37 CFR 1.114 AFTER ALLOWANCE OR QUAYLE ACTION

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after allowance or after an Office action under Ex Parte Quayle, 25 USPQ 74, 453 O.G. 213 (Comm'r Pat. 1935). Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, prosecution in this application has been reopened pursuant to 37 CFR 1.114.

Applicant's submission filed on 1-31-03 has been entered.

Claims 43-61 are currently pending and are present for examination.

Priority

Acknowledgment is made of applicant's claim for foreign priority under 35 U.S.C. 119(a)-(d). The certified copy has been received in this Application. Applicant's claim for domestic priority under 35 U.S.C. 119(e) is also acknowledged.

Claim Rejections - 35 USC § 101

35 U.S.C. 101 reads as follows:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

Claims 43-61 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter. Claims 43-61 are directed to "An enzyme..." which reads on the product of nature. Amending the claim to recite "An isolated or purified enzyme..." to show the hand of man would overcome this rejection.

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Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claim 43 and claims 44-61 all of which depend from claim 43 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Claim 43 is rejected because of the confusion in the claimed amino acid residue numbers of SEQ ID NO:2. Claim 43 is directed to an isolated enzyme having "an amino acid sequence that is at least 75% identical to positions 1-456 or 1-617 of SEQ ID NO:2". However, the specification has no support for such an enzyme instead has support for such an enzyme having an amino acid sequence that is at least 75% identical to positions 26-485 or 26-646 (for example, see page 11, lines 13-34 and elsewhere). It appears that applicants have reassigned SEQ ID NOS and renumbered the amino acids in SEQ ID NO:2. However, it appears that applicants have failed to make appropriate changes in the specification rendering the claims indefinite.

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 43-48, 54-60 are rejected under 35 U.S.C. 112, first paragraph, because the specification, while being enabling for an β 1,4-endoglucanase enzyme with SEQ ID NO:2 or amino acids 1-

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456 or 1-617 of SEQ ID NO:2 with an optimum temperature of 65° C when measured at a pH of 7.5, active at a pH in the range of 4-11, and isolated from *B.licheniformis*, does not reasonably provide enablement for any such enzyme that has 75%, 85%, 90%, 95% or 98% sequence identity with amino acids 1-456 or 1-617 of SEQ ID NO:2. The specification does not enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make the invention commensurate in scope with these claims.

Factors to be considered in determining whether undue experimentation is required, are summarized in *In re Wands* (858 F.2d 731, 8 USPQ 2d 1400 (Fed. Cir. 1988)) as follows: (1) the quantity of experimentation necessary, (2) the amount of direction or guidance presented, (3) the presence or absence of working examples, (4) the nature of the invention, (5) the state of the prior art, (6) the relative skill of those in the art, (7) the predictability or unpredictability of the art, and (8) the breadth of the claim(s).

Claims 43-48, 54-60 are so broad as to encompass any β 1,4-endoglucanase enzyme that has 75%, 85%, 90%, 95% or 98% sequence identity with amino acids 1-456 or 1-617 of SEQ ID NO:2. The scope of the claims is not commensurate with the enablement provided by the disclosure with regard to the extremely large number of β 1,4-endoglucanases broadly encompassed by the claims. Since the amino acid sequence of a protein determines its structural and functional properties, predictability of which changes can be tolerated in a protein's amino acid sequence and obtain the desired activity requires a knowledge of and guidance with regard to which amino acids in the protein's sequence, if any, are tolerant of modification and which are conserved (i.e. expectedly intolerant to modification), and detailed knowledge of the ways in

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which the proteins' structure relates to its function. However, in this case the disclosure is limited to the nucleotide and encoded amino acid sequence of only a single β 1,4-endoglucanase.

While recombinant and mutagenesis techniques are known, it is not routine in the art to screen for multiple substitutions or multiple modifications, as encompassed by the instant claims, and the positions within a protein's sequence where amino acid modifications can be made with a reasonable expectation of success in obtaining the desired activity/utility are limited in any protein and the result of such modifications is unpredictable. In addition, one skilled in the art would expect any tolerance to modification for a given protein to diminish with each further and additional modification, e.g. multiple substitutions.

The specification does not support the broad scope of the claims which encompass all modifications and fragments of any β 1,4-endoglucanase having 75% through 98% identity to SEQ ID NO:2 because the specification does not establish: (A) regions of the protein structure which may be modified without effecting endoglucanase activity; (B) the general tolerance of β 1,4-endoglucanase to modification and extent of such tolerance; (C) a rational and predictable scheme for modifying any β 1,4-endoglucanase amino acid residues with an expectation of obtaining the desired biological function; and (D) the specification provides insufficient guidance as to which of the essentially infinite possible choices is likely to be successful.

Thus, applicants have not provided sufficient guidance to enable one of ordinary skill in the art to make and use the claimed invention in a manner reasonably correlated with the scope of the claims broadly including β 1,4-endoglucanases with an enormous number of amino acid modifications of the β 1,4-endoglucanase SEQ ID NOS: 2. The scope of the claims must bear a reasonable correlation with the scope of enablement (In re Fisher, 166 USPQ 19 24 (CCPA

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1970)). Without sufficient guidance, determination of β 1,4-endoglucanases having the desired characteristics is unpredictable and the experimentation left to those skilled in the art is unnecessarily, and improperly, extensive and undue. See *In re Wands* 858 F.2d 731, 8 USPQ2nd 1400 (Fed. Cir, 1988).

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 43-58, 60-61 are rejected under 35 U.S.C. 102(b) as being anticipated by Dhillon et al. (Biotechnol. Lett, Vol. 7(9):695-697, 1985). This rejection is based upon the public availability of a printed publication. Claims 43-61 of the instant application are drawn to an endoglucanase, a polypeptide having a sequence of at least 75%, 85%, 90%, 95%, 98% identity to positions 1-456 or 1-617 of SEQ ID NO:2, a polypeptide encoded by DNA sequence from the plasmid in *E.coli* DSM 12805, the endoglucanase belonging to the family 9 of glycosyl hydrolases, the enzyme obtained from *B.licheniformis*, such as *B.licheniformis* ATCC 14580, the enzyme which exhibits the enzymatic activity in the pH range of 4-11, and a temperature optimum of 65° C when measured at pH 7.5, a composition comprising the above enzyme. Claim 60 is drawn to a method of degradation of cellulose-containing biomass using the above enzyme. A perusal of the specification indicates that the above enzyme was isolated from a publicly available *B.licheniformis* ATCC 14580. Dhillon et al. disclose an endoglucanase obtained from a strain of *B.licheniformis*-1 which is active in the pH range 4-11 wherein the activity was

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measured at an elevated temperature of 55° C. The reference also discloses a composition comprising the enzyme and a method of degradation of cellulose-containing biomass and a method of obtaining the enzyme by growing the culture comprising a DNA which encodes the above enzyme. Based on the characteristics provided in the reference (i.e., the source of the enzyme and the activity in the pH range 4-11, its activity at an elevated temperature of 55° C) and in the above claims, Examiner takes the position that the enzyme in the reference and the instant enzyme and the respective *B.licheniformis* strain from which the enzymes are obtained are one and the same even though the reference does not recite the same strain and other characteristics such as the enzyme belonging to family 9 or the amino acid sequence information or its temperature optimum). Even though the reference does not disclose any amino acid sequence information or classify the enzyme as belonging to "family 9" or determine its temperature optimum, such characteristics are inherent to the enzyme. Therefore, the enzyme in the reference has either the same sequence as that in the instant application or is at least 75% to 98% identical to the amino acid sequence with SEQ ID NO:2. Therefore, Examiner takes the position that Dhillon et al. anticipate claims 43-58 and 61 of this application as written.

Since the Office does not have the facilities for examining and comparing applicants' bacterial strain and the enzyme with the bacterial strain and the enzyme of the prior art, the burden is on the applicant to show a novel or unobvious difference between the claimed product and the product of the prior art (i.e., that the protein of the prior art does not possess the same material structural and functional characteristics of the claimed protein). See *In re Best*, 562 F.2d 1252, 195 USPQ 430 (CCPA 1977) and *In re Fitzgerald et al.*, 205 USPQ 594.

Claim Rejections - 35 USC § 103

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The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claim 59 is rejected under 35 U.S.C. 103(a) as being unpatentable over Dhillon et al. as applied to claims 43-58, 60-61 above, and further in view of Olsen et al. (WO 95/26398, 10-5-1995). Claim 59 in this instant application is drawn to a composition comprising the endoglucanase (of claim 1) further comprising an enzyme selected from a group consisting of proteases, cellulases, hemicellulases etc.

As described in the previous paragraphs, Dhillon et al. teach an endoglucanase obtained from a strain of *B.licheniformis*-1 which is active in the pH range 4-11. However, the reference does not teach a composition of the enzyme further comprising other enzymes such as protease or hemicellulases.

Olsen et al. teach an enzyme preparation comprising a cellulase (an endoglucanase). Even though the enzyme is not from *B.licheniformis*, the reference does teach the importance of endoglucanase in the detergent making industry. The reference explicitly teaches that the Beta-1,4-bond hydrolyzing capacity of the enzyme is made use of in paper-making and baking industry as well. The reference also teaches the use of the endoglucanase enzyme in compositions comprising additional enzymes such as proteases and hemicellulases (see claim 13).

It would have been obvious to one skilled in the art at the time the invention was made to use the enzyme provided by Dhillon et al. and prepare a composition comprising additional

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enzymes such as a protease or hemicellulase as taught by Olsen et al. for use either as a detergent additive or in baking and paper-making industry. This is because while Dhillon et al. disclose the enzyme, Olsen et al. describe in detail the use of such endoglucanases in the industry. One of ordinary skill in the art would have been motivated to do so as Dhillon et al. teach an endoglucanase that can be easily made from a bacillus culture and Olsen et al. provide a number of uses for such enzyme either alone or along with other enzymes. One skilled in the art would have a reasonable expectation of success since Dhillon et al. provides the enzyme and Olsen et al. demonstrates the use of the enzyme along with other enzymes.

Therefore the claimed invention would have been *prima facie* obvious to one of ordinary skill in the art.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(f) or (g) prior art under 35 U.S.C. 103(a).

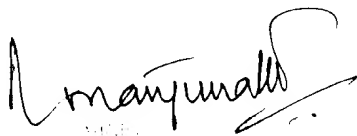
Conclusion

None of the claims are allowable.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Manjunath Rao whose telephone number is (703) 306-5681. The

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Examiner can normally be reached on M-F from 7:30 a.m. to 4:00 p.m. If attempts to reach the Examiner by telephone are unsuccessful, the Examiner's supervisor, P.Achutamurthy, can be reached on (703) 308-3804. The fax number for Official Papers to Technology Center 1600 is (703) 305-3014. Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0196.

A handwritten signature in black ink, appearing to read 'Manjunath N. Rao', with a stylized flourish at the end.

Manjunath N. Rao Ph.D.
5/12/03